

Topic:

Ternary Organic Solar Cells and Flexible Energy Storage Devices

Speaker:

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Date: 4 March 2016

Time: 10.30am – 12.30pm

Venue: Room Y402

Abstract:

Recently, nanostructures of conducting polymers were found to be particularly advantageous for energy conversion and storage, which will lead to a future application in high performance flexible devices. My talk will include two parts:

Ternary organic solar cells (OSCs)

Compared with binary OSCs, ternary systems containing two donors and one acceptor (or one donor and two acceptors) can broaden the absorption range of active layers through complementary absorption of two donors, thereby providing a potentially effective route in achieving high J_{sc} and thus high efficiency. A novel ternary OSC is designed and fabricated by our group, which contains a D–A-type polymer and a high-crystalline small molecule as donors and fullerene derivatives as acceptor. By the optimization of the ternary system, a PCE of 10.5% was obtained, which is among the highest values for OSCs.

Nanostructures of conducting polymers for flexible energy storage devices

We introduced a facile one-step approach to prepare vertically aligned conducting nanowire arrays on various substrates. Importantly, aligned nanowire arrays exhibited high capacitance as an electrode material for supercapacitors even at very high charge-discharge current densities. Moreover, this strategy can be extended to produce flexible lithium ion batteries by using polyimide as an electrode material. This strategy is facile to produce flexible energy storage devices possessing the merits of large capacitance, high rate capability and good stability, which may lead to a future application in high performance flexible devices.